

Low Cost, Low Profile Steerable SATCOM Antenna, Phase I

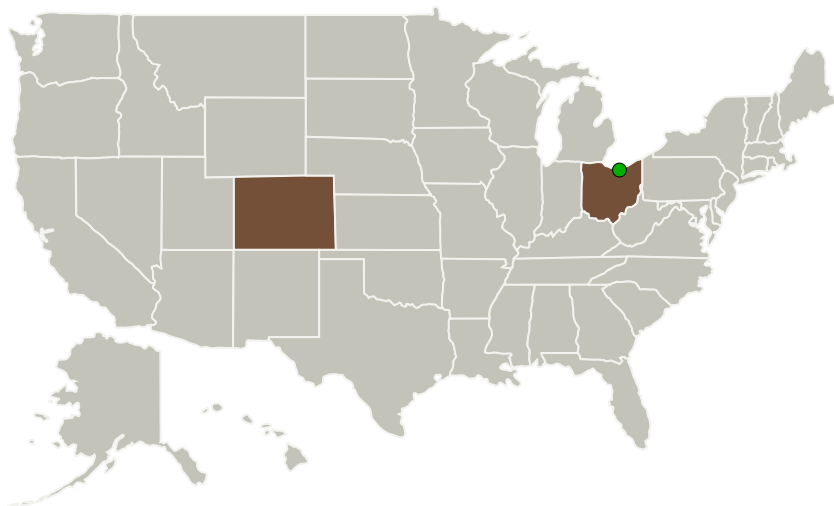
Completed Technology Project (2014 - 2014)



Project Introduction

The small size of Unmanned Aerial Vehicle (UAV) platforms along with the need to reduce drag to increase flight time creates a need for low-profile antennas. The oldest solution, a mechanically steered parabolic reflector, does not provide a low profile. The modern electronically steered phased array is an alternative that does provide a low-profile antenna solution, but the cost of these antennas has prevented wider use. Hybrid antenna solutions that are partly mechanically steered and partly electronically steered are an approach to maintain the low profile of a phase array at much lower cost. Although existing hybrid solutions offer potential, there have been limitations in scan speed and Field-of-View (FOV). FIRST RF has demonstrated the initial proof-of-concept capability of an innovative low-profile hybrid scan phased array antenna that reduces cost by nearly an order of magnitude relative to a conventional phased array for low profile applications and removes the limitations of previous designs in scanning and FOV. This approach uses small mechanical actuators to reduce the parts count of the active components in the electronic steering portion of the aperture. Unlike other hybrid scan solutions, which have asymmetrical fast and slow steering, this approach provides symmetrical fast electronic steering at angles near boresite with slower mechanical steering for large off-boresite angles. The scan loss of this approach is actually lower than for fully electronic scanned phased array antennas, and the FOV is greater. This technology is applicable for Unmanned Aircraft Systems (UAS) applications.

Primary U.S. Work Locations and Key Partners



Low Cost, Low Profile Steerable SATCOM Antenna Project Image

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Organizations Performing Work	Role	Type	Location
FIRST RF Corporation	Lead Organization	Industry	Boulder, Colorado
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Colorado	Ohio

Project Transitions

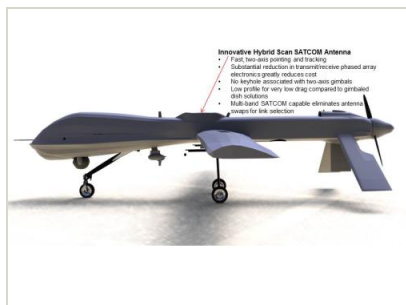
▶ **June 2014:** Project Start

✓ **December 2014:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137662>)

Images



Project Image

Low Cost, Low Profile Steerable SATCOM Antenna Project Image (<https://techport.nasa.gov/image/126237>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

FIRST RF Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

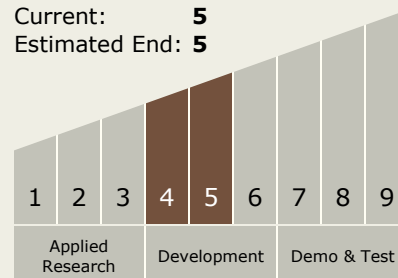
Carlos Torrez

Principal Investigator:

Dean Paschen

Technology Maturity (TRL)

Start: 4
Current: 5
Estimated End: 5



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Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.2 Radio Frequency
 - └ TX05.2.6 Innovative Antennas

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System